Chapter 1

Little Salmon River Subbasin

Total Maximum Daily Load

Implementation Plan for Agriculture

Developed for the Idaho Department of Environmental Quality
Prepared by the Idaho Association of Soil Water Conservation Districts and
the Idaho Soil Conservation Commission
In Cooperation with the Adams Soil and Water Conservation District

DRAFT
June 16, 2008

Table of Contents

Introduction

PURPOSE

The Little Salmon River (LSR) Total Maximum Daily Load (TMDL) Implementation Plan for Agriculture outlines an adaptive management approach for implementation of best management practices (BMPs) and resource management systems (RMS) on agricultural lands to meet the requirements of the *Little Salmon River Subbasin Assessment and TMDL* (*Little Salmon River TMDL*). The intent of the BMPs and RMS outlined in the plan is to restore designated beneficial uses on the §303(d) listed streams within the Little Salmon River Watershed by reducing pollutant contributions from privately owned parcels of agricultural land.

GOALS AND OBJECTIVES

The primary goal of this plan is to assist and/or compliment other watershed efforts to restore beneficial uses for the §303(d) listed stream segments within the Little Salmon River subbasin. These water quality impaired stream segments are identified in the 2002 §303(d) list for the LSR subbasin (Table 1). The primary objective of this plan is to reduce the amount of pollutants entering these listed water bodies from agricultural-related practices.

Table 1. 2002 §303(d) listed water bodies in the Little Salmon River subbasin.

Water body	*Listed Pollutants*	*TMDL Developed*
Little Salmon River	sediment & temperature	temperature, bacteria, nutrients
Big Creek	unknown	bacteria
Elk Creek	sediment	none
Indian Creek	sediment	none
Shingle Creek	sediment	none
Brundage Reservoir	temperature	none

(IDEQ, 2006)

The State of Idaho has adopted a non-regulatory approach to control agricultural non-point pollution sources. However, regulatory authority can be found in the Idaho Water Quality Standards and Wastewater Treatment Requirements (Idaho Administrative Procedure Act 58.01.02.350.01 through 58.01.02.350.03), which provides direction to the agricultural community and includes a list of approved BMPs.

The Little Salmon River Watershed Advisory Group (WAG), Idaho Department of Environmental Quality (IDEQ), United States Forest Service (USFS), Idaho State Department of Agriculture (ISDA), Idaho Department of Lands (IDL), Idaho Soil Conservation Commission (ISCC), and Idaho Association of Soil Conservation Districts (IASCD), were involved in developing the pollutant allocation and their continued participation will be critical while implementing this TMDL Implementation Plan for Agriculture. A portion of the *Idaho Agricultural Pollution Abatement Plan* (APAP) outlines responsible agencies or elected groups designated to address non-point source pollution problems.

For agricultural activities on private land, the Adams Soil and Water Conservation District (ASWCD) in cooperation with the ISCC, the IASCD, and the Natural Resources Conservation Service (NRCS) can assist landowners in developing and implementing conservation plans that incorporate BMPs that will help meet TMDL allocation targets.

Additional objectives of this plan are the implementation of a water quality outreach program, a BMP effectiveness evaluation process, and an ongoing water quality monitoring program. The intent of the outreach program will be twofold. First to educate landowners about the TMDL process and the reduction of agricultural impacts on the designated beneficial uses of the listed stream segments, and second to encourage landowner participation in the application of BMPs. The BMP effectiveness evaluation process and monitoring program are designed to measure a BMPs effectiveness to reduce pollutants and through before and after water quality monitoring hopefully show improvement in the water body itself.

Background

PROJECT SETTING

The Little Salmon River subbasin covers approximately 369,000 acres (576 square miles) in western Idaho (Figure 1). The subbasin is 45 miles long and covers areas of both Adams County and Idaho County. The subbasin is very sparsely populated with a total population of 1,948 citizens in 2000 (NRCS, 2007). However, development is expanding the northern portion of the subbasin due to its proximity to the resort community of McCall. The two primary cities in the subbasin are the town of New Meadows, population 533, and the town of Riggins, population 410 (2000 data; www.city-data.com).

The Little Salmon River drains the subbasin from the south near New Meadows to the north where it enters the mainstem Salmon River near Riggins (Figure 1). The subbasin is bounded by the Seven Devils Mountains to the west and the Salmon River Mountains to the east. Elevations in the subbasin range from over 9000 feet in the Seven Devils headwaters to less than 1800 feet at the mouth (NRCS, 2007). The subbasin can be divided into three primary areas: high elevation mountains with slopes of 60% or more covered with mixed conifer forests where the majority of precipitation falls and feeds the Little Salmon River via its tributaries; the meadows area in the upper valley bottom above Round Valley Creek characterized by a low-gradient, meandering stream channel with a native grass and shrub community; and the canyon section of the valley bottom below Round Valley Creek with steeper stream gradients and a warmer, more arid landscape (IDEQ, 2006; NRCS, 2007).

Climate in the subbasin varies greatly by elevation. Annual precipitation ranges from more than 50 inches at Brundage Mountain to the north to less than 20 inches in the town of Riggins at the mouth. Most precipitation occurs as snow. In general winters are cold and wet and summers are hot and dry. Average January temperatures range from 7 - 30°F in New Meadows to 27 - 41°F in Riggins. Average July temperatures range from 42 - 84°F in New Meadows to 58 - 92°F in Riggins (IDEQ, 2006).

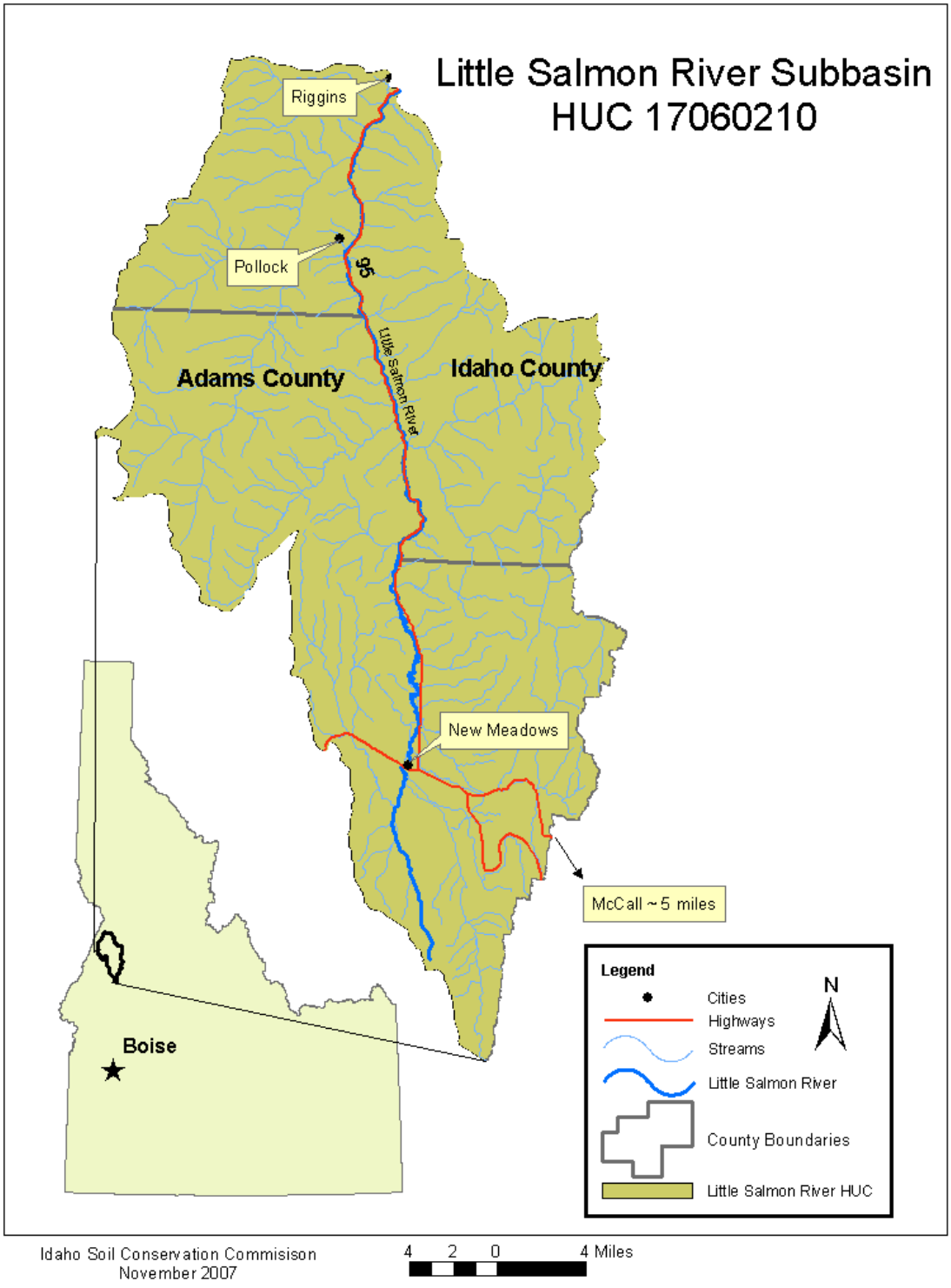

Figure 1. Little Salmon River subbasin location in Idaho.

The LSR subbasin contains seven level IV ecoregions (Figure 2). The five ecoregions that cover the most ground in the subbasin are described as follows. The flat valley bottom around New Meadows is located within the High Glacial Drift-Filled Valleys region characterized by outwash plains, wetlands, and hills. This area is referred to as the Little Salmon River meadows area. Native vegetation in this region is typically sedge and rush in wet bottom areas with bunchgrass, sagebrush, lodgepole pine, and ponderosa pine on drier sites. This ecoregion has been mainly converted to agriculture or residential development; therefore, it is ecoregion where most of the agricultural BMPs recommended in this plan will be implemented. The Southern Forested Mountains region, located in the subbasin's eastern headwaters, has drought-prone granitic soils covered with an open Douglas-fir dominated forest with areas of ponderosa pine, sagebrush, and grasses. The Wallowas/Seven Devils Mountain region spans the subbasin's northwestern high elevation headwaters. This region also contains Douglas fir and ponderosa pine forests. Little Salmon River tributaries from the Seven Devils tend to have steep gradients with deeply eroded canyons. Finally, the lower southwestern headwaters falls within the Canyons and Dissected Highlands region and the area around the mouth of the Little Salmon River is within the Canyons and Dissected Uplands region. These two regions are characterized by dry deep river canyons in the rain shadow of the Seven Devils. Native vegetation in the Highlands area is primarily Douglas fir and ponderosa pine while the lower, drier Uplands area is predominately grassland (McGrath, Woods., Omernik, Bryce, Edmondson, Nesser, Shelden, Crawford, Comstock, and Plocher, 2002.).

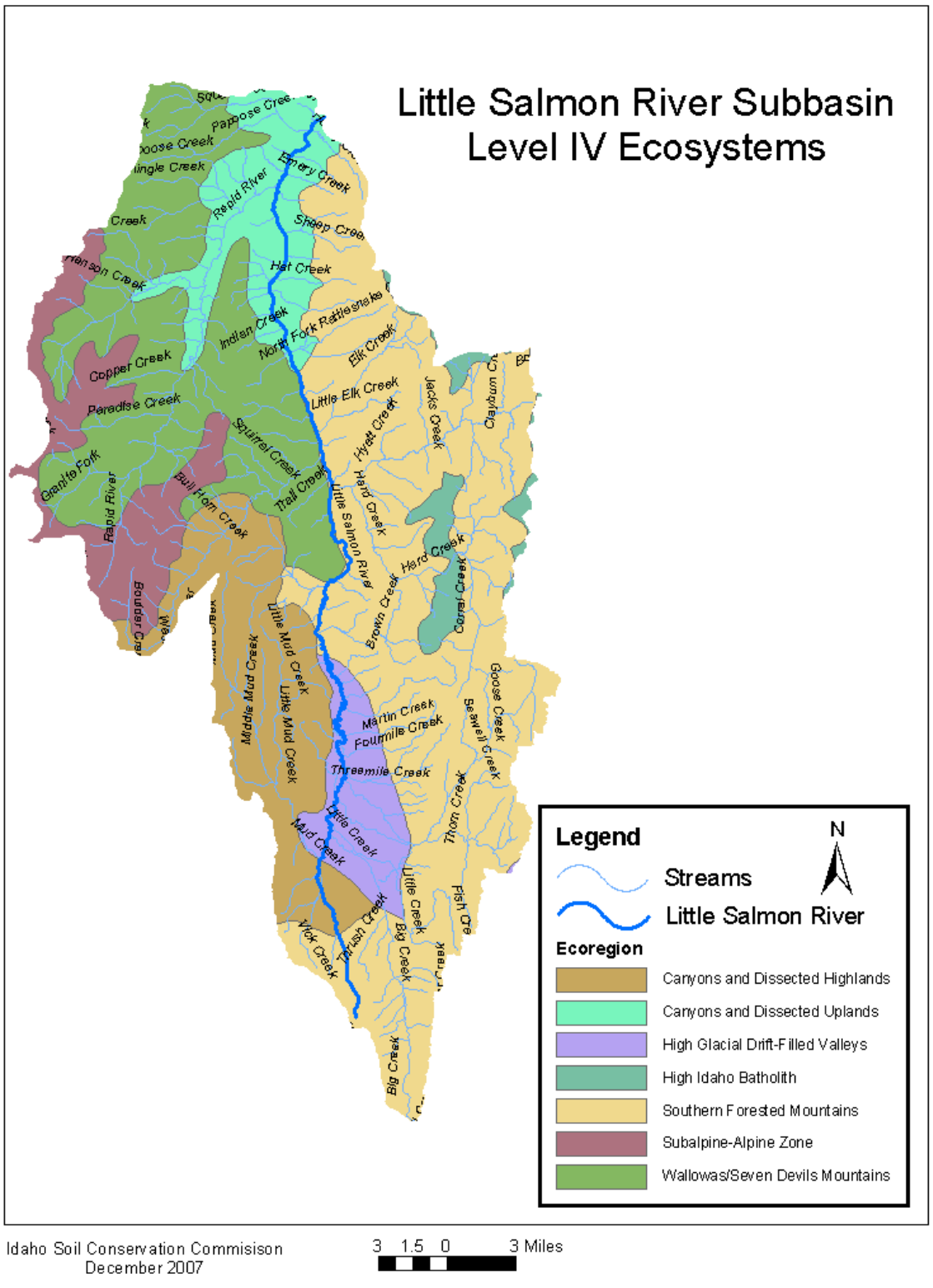

Figure 2. Level IV ecoregions in the Little Salmon River subbasin.

SUBWATERSHEDS

The Little Salmon River subbasin is a HUC (hydrologic unit code) 4 level watershed. A HUC is a numbering system for watersheds. Please see the following USGS website (http://water.usgs.gov/GIS/huc.html) for an explanation of the HUC (hydrologic unit code) system. The LSR subbasin is divided into two HUC subwatersheds, Upper Little Salmon River and Big Creek, and then further subdivided into 19 HUC 12 level subwatersheds. This implementation plan will only consider the subwatersheds with streams that do not meet water quality criteria and therefore have a completed TMDL (Table 1). These are the four subwatersheds that feed the Upper Little Salmon River (meadows area) above Round Valley Creek, which will be considered together in this plan, and Big Creek (Table 2 and Figure 3).

Table 2. Subwatersheds in the LSR subbasin with developed TMDLs.

Subwatershed	*HUC 12 Subwatersheds*	*§303(d) Segments*	*Stream Length*	*Listed Pollutants*
Upper Little Salmon River	Lower Meadows Valley, Sixmile Creek, Lower Goose Creek, Upper Little Salmon River	Big Creek to Round Valley Creek	12.5 miles	temperature, bacteria, nutrients
		Vicks Creek to Big Creek	2.5 miles	temperature
Big Creek	Big Creek	1st and 2nd order streams	4.4 miles	bacteria, nutrients

(IDEQ, 2006; USGS 1:24,000 DLG stream GIS data; & USGS HUC GIS data)

The Upper Little Salmon River subwatershed upstream of Round Valley creek is characterized by a low gradient Rosgen C channel type with good access to the natural floodplain (IDEQ, 2006). This reach flows almost entirely through privately owned agricultural and urban residential lands. The subwatershed upstream of Vicks Creek is forested. .

Big Creek drains the southeast side of the upper subbasin. This tributary begins at 6,600 feet in publicly owned timber lands and flows north through private timber and rangeland before entering through the low gradient private agricultural lands and rural residential parcels in the valley bottom. Big Creek enters the Little Salmon River about one mile southwest of New Meadows (IDEQ, 2006).

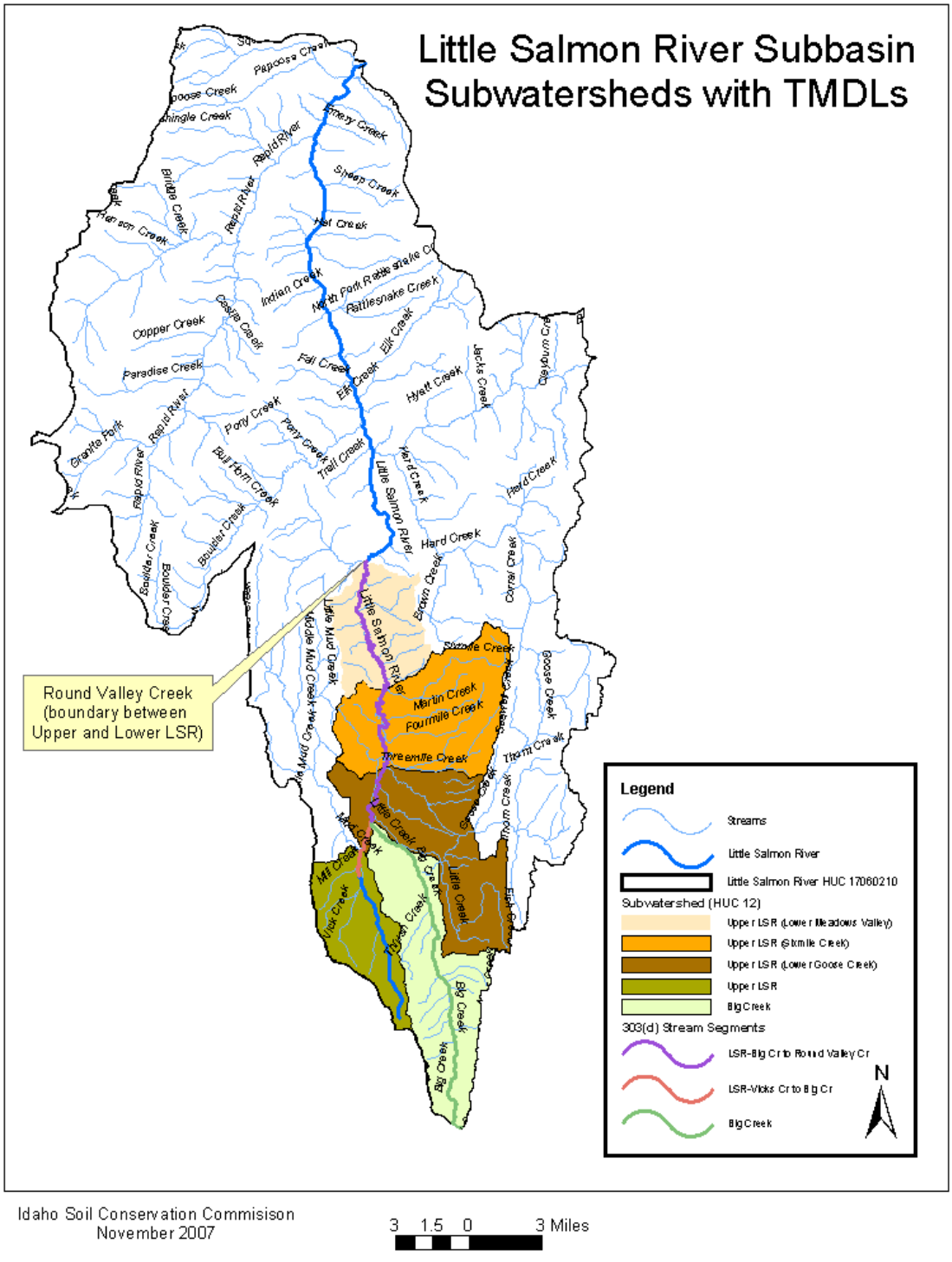

Figure 3. Subwatersheds with TMDLs and §303(d) streams in the Little Salmon River subbasin.

LAND OWNERSHIP

Land in the Little Salmon River subbasin is approximately 69% publicly owned and 31% privately owned. The primary public land management agency in the subbasin in the USFS followed by the BLM and the State of Idaho. The Nez Perce Tribe owns a small parcel (less than five acres) near the Rapid River (Table 3). Private lands are concentrated along the lower elevation flood plains and valley bottoms, while public lands are primarily located in the uplands (Figure 4) (IDEQ, 2006).

Table 3. Land ownership in the Little Salmon River subbasin.

Land Owner	*Approximate Acreage*	*% of Subbasin*
Private	114,350	31
BLM	16,170	4
USFS	224,790	61
State	13,410	4
Nez Perce Tribe	<5	<1
TOTAL	~368,720*	100%

(IDEQ, 2006) * estimates of total acreage in the basin vary by source

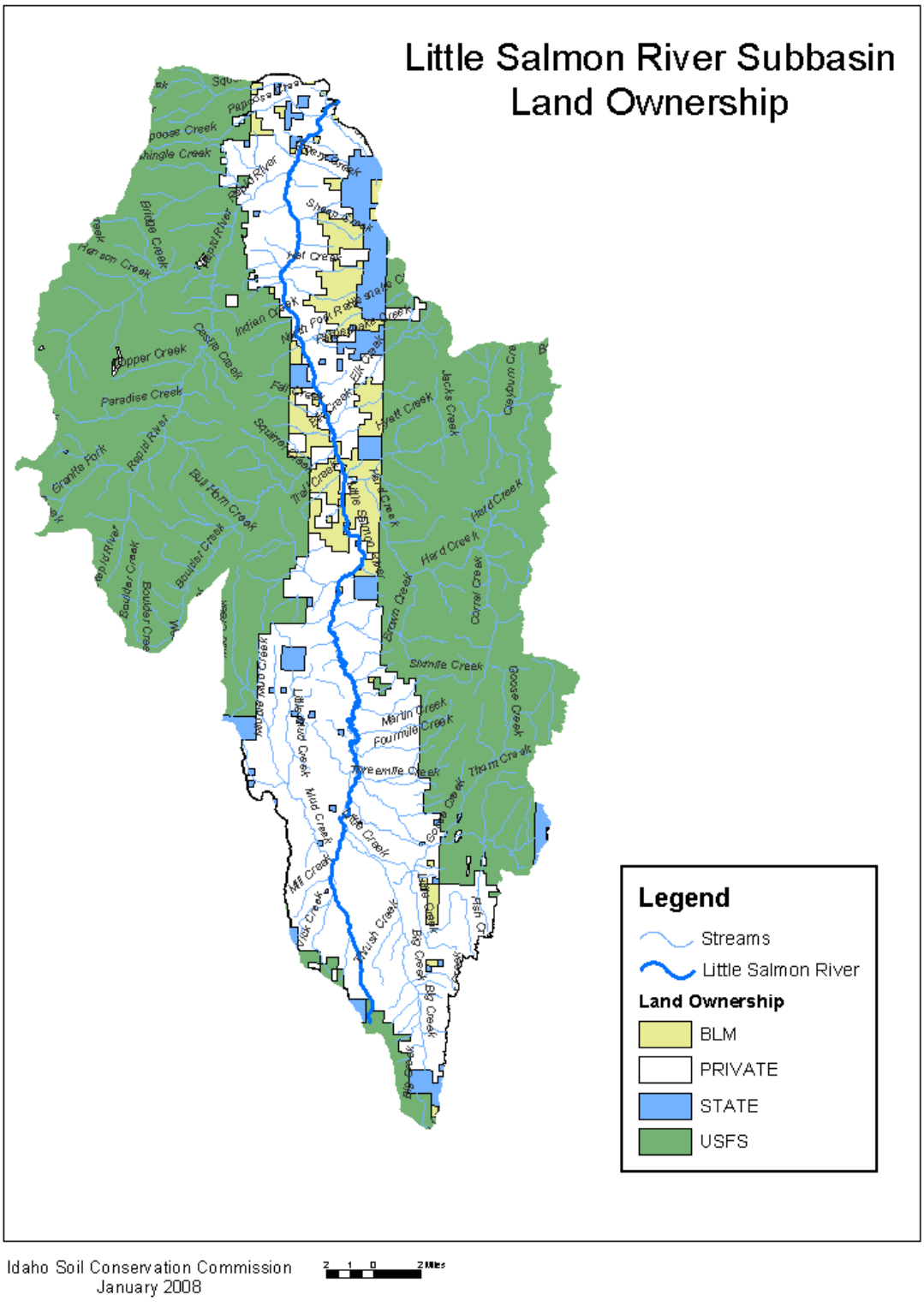

Figure 4. Little Salmon River Subbasin land ownership.

LAND USE AND COVER

The primary land use in the Little Salmon River subbasin is forest. Forested lands are located in the higher elevations and are used primarily for grazing, timber, wildlife habitat, and recreation. The shrub rangelands are located directly below the forested elevations and are used primarily for grazing, wildlife habitat, and recreation. Grazing season on public lands is from mid-April to mid-November. Cattle are moved to private lower elevation grass, pasture, and haylands during the winter months. These areas include both surface irrigated lands in the valley bottoms and non-irrigated haylands. Grain crops and protected wetland acres cover only a very small portion of the subbasin (NRCS, 2007). The remainder of land is located in developed areas like the towns of New Meadows, the Meadow Creek Golf Resort, and Riggins. Lands classified as barren are primarily located on mountain tops. See Figure 5 and Table 4 below for additional information on land use in the subbasin

Table 4. Land Use/Land Cover in the Little Salmon River subbasin.

Land Use/Land Cover Category	*Approximate Acreage*	*% of Subbasin*
Forest	247,410	~67
Brush/shrub	47,870	~13
Grass (non agriculture)	28,890	~8
Barren/rock	12,000	~3
Agriculture	11,580	~3
Riparian	9,620	~2.5
Burn Areas	4,360	~1
Water	1,808	<1
Urban	160	<1
no data available	5,750	~1.5
TOTAL	369,448*	~100

(IWRB, 2001) * estimates of total acreage in the basin vary by source

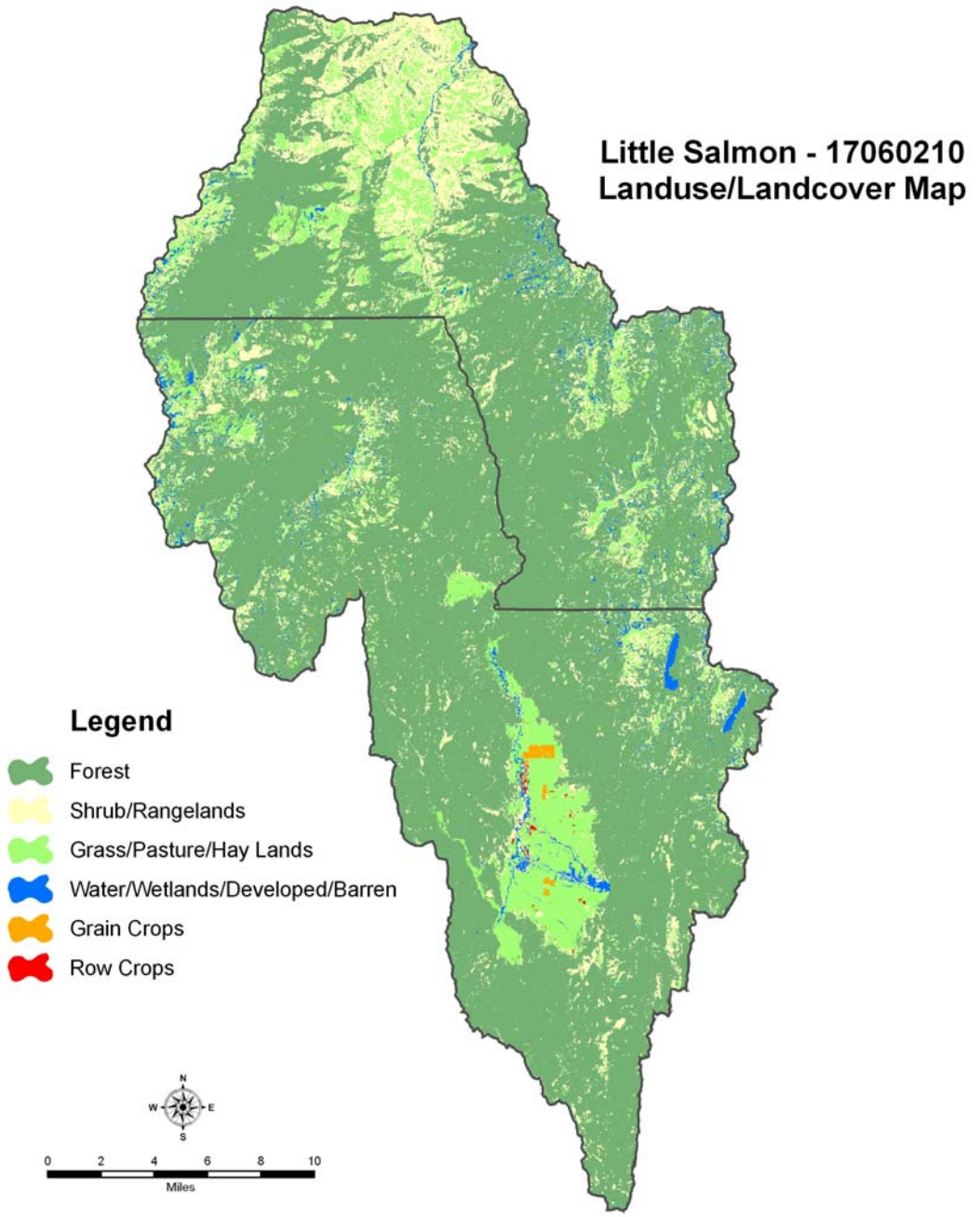

Figure 5. Land use and land cover in the Little Salmon River subbasin.

CONSERVATION ACCOMPLISHMENTS

Part of the TMDL implementation planning process includes reviewing and summarizing conservation practices installed to date in the subbasin. These existing BMPs are monitored for effectiveness by field staff (see the Monitoring and Evaluation section of this plan) as part of the adaptive management approach and the recommendations for new BMP implementation priorities take into consideration the location and effectiveness of BMPs currently in place. For the purpose of this plan, only agriculture related conservation efforts in subwatersheds containing water bodies that do not meet water quality criteria are considered in this process. These water bodies are all located in the upper subbasin above the mouth of Round Valley Creek.

Recent Conservation Treatments in the Upper Subbasin

The NRCS tracks conservation treatments installed in the subbasin from both their cost share programs and other state or federal cost share programs. BMPs installed as treatment through these cost share programs reflect an investment by landowners to improve resource conditions on their lands. Individual conservation treatments applied during fiscal years 2005 – 2006 are summarized in Table 5 below.

Table 5. Recently applied conservation treatments in the upper LSR subbasin.

Conservation Treatment (BMP)	*FY05*	*FY06*	*TOTAL*
Fence (riparian or other)	4,692 ft	1,964 ft	6,656 ft
Fish Passage (number)	-	3	3
Irrigation System, Surface & Subsurface	156 acres	-	156 acres
Pest Management	-	200 acres	200 acres
Pipeline	-	2,585 acres	2,585 acres
Prescribed Grazing	-	1,980 acres	1,980 acres
Row Arrangement	1 acre	-	1 acre
Spring Development (number)	-	3	3
Streambank & Shoreline Protection	-	500 ft	500 ft
Structure for Water Control (number)	-	2	2

(NRCS, 2007)

Wetlands Reserve Program

There are 274 acres of wetland habitat protected in a 30 year conservation easement under the Wetlands Reserve Program in the Upper Little Salmon River subwatershed. This project is the product of the collaboration between the private landowner and the NRCS, BLM, IDFG, United States Fish and Wildlife Service (USFWS), and Adams SWCD. In 2000, project sponsors began the process of converting marginal pasture land into wetland by plugging drainage ditches to raise the water table, reestablishing river access to old oxbows, planting native willow species

along more than two miles of the Little Salmon River, installing fencing to protect the riparian area, and developing off site water sources for livestock. Since 2000, the extent and health of native riparian vegetation in this protected wetland has increased providing critical wildlife habitat and improving water quality by increasing bank stability and providing shade and a means to trap sediments and nutrient from overland flows.

Overview of Wetland Reserve Project area on the Little Salmon River (2001).

Conservation Reserve Program

There are 14 acres enrolled in the Conservation Reserve Program (CRP) on the East Branch of Goose Creek in the Upper Little Salmon River subwatershed. These riparian acres have been excluded from livestock use since 2000, and will remain in exclusion until 2011. With the help of use exclusion and willow plantings, this area shows good recovery of riparian functions (personal communication with Ron Brooks, NRCS 1/2/08).

Brundage Watershed Land Treatment Project

The Brundage Watershed Land Treatment Project was initiated in 1990s for the purpose of improving pasture management and productivity, irrigation water management, and grazing management in the LSR subbasin. This NRCS project was implemented over 10 years and involved 14 landowners, 3, 467 acres of pasture/hay land, and an investment of $566,000. BMPs installed through this project included: pasture management planning, hayland planting, fencing, stockwater systems, and irrigation water management systems including land leveling, structures for water control, gated pipe. BMPs were installed on agricultural lands adjacent or near the Little Salmon River and the following tributaries: Martin Creek, Four Mile Creek, Six Mile Creek, Big Creek, East and West branch of Goose Creek, Little Creek, and Three Mile Creek. This project accomplished significant improvements in the resource condition of the treated acres and the areas that were seeded have now mostly converted back to native grasses (personal communication with Ron Brooks, NRCS 1/9/08).

Water Quality Problems

BENEFICIAL USE STATUS

Beneficial uses describe the possible uses of a water body in its unpolluted, fully functioning state. Idaho water quality standards require that the beneficial uses of all water bodies in the state be protected. Beneficial uses can include existing uses, designated uses, and presumed existing uses. When beneficial uses are undesignated, the water body is presumed to have cold water and primary or secondary contact recreation beneficial uses (IDEQ, 2006). When IDEQ determines that beneficial uses are not supported through their water body assessment process, as they did on the Little Salmon River and Big Springs Creek in this subbasin, it is an indication of water quality problems, and those water bodies are placed on the subbasin's §303(d) list for water quality improvement. As stated earlier, the primary objective of this plan is to reduce the amount of pollutants entering §303(d) listed water bodies from agricultural-related practices in order to support beneficial uses. Beneficial uses for water bodies on the §303(d) list in the LSR subbasin with TMDLs developed are listed below in Table 6.

Table 6. Beneficial uses and support status for §303(d) listed stream segments in the LSR subbasin.

Water Body (subwatershed)	*Beneficial Uses*	*Support Status*
Upper Little Salmon River (meadow area)	cold water, salmonid spawning, primary contact recreation, domestic water supply, special resource water	not full support
Big Creek	undesignated—presumed cold water and primary/secondary contact recreation	not full support
Brundage Reservoir	undesignated—presumed cold water and primary/secondary contact recreation	full support—proposed for delisting
Elk Creek	undesignated—presumed cold water and primary/secondary contact recreation	full support—proposed for delisting
Indian Creek	undesignated—presumed cold water and primary/secondary contact recreation	full support—proposed for delisting
Shingle Creek	undesignated—presumed cold water and primary/secondary contact recreation	full support

(IDEQ, 2006)

POLLUTANTS

As indicated by their inability to support beneficial uses, the Upper Little Salmon River and Big Creek subwatersheds have significant water quality problems. These problems occur in the meadows reach of the Upper Little Salmon River, the low gradient, meandering reach located above Round Creek in the Upper Little Salmon River subwatershed, and the lower portion of the Big Creek subwatershed during the summer months when naturally low flows are further diminished by irrigation withdrawals. During this critical period, excess phosphorus load combined with higher water temperatures and low streamflows leads to excess aquatic plant growth which drives dissolved oxygen levels below water quality standards. Monitoring data

also show that *E-coli* levels exceed water quality standards in these areas. Sediment is not considered a concern at this time (Campbell, 2005, 2006, 2007). Pollutants of concern in these subwatersheds are phosphorous, bacteria, and temperature (IDEQ, 2006).

Phosphorous

Idaho State Department of Agriculture (ISDA) monitoring data show that phosphorous levels in the Upper LSR and lower Big Creek exceed state criteria and promote a nuisance level of periphyton (algae) (Campbell, 2005, 2006, 2007). A TMDL was written for total phosphorous (TP) for the Upper LSR between Big Creek and Round Valley Creeks and Big Creek. Critically high TP and depressed dissolved oxygen levels occur only during the summer months; therefore, the load capacity target for TP set in the TMDL applies only during the critical period defined by IDEQ as June 21 – September 22 (IDEQ, 2006). See Table 7 below for the load capacity and required reductions for TP in the Upper LSR and Big Creek.

Bacteria

Like TP, ISDA monitoring data show that *E.coli* levels exceed state water quality standards during the summer months at monitoring sites on the Upper LSR and Big Creek. The TMDL for bacteria also follows the same critical period as TP, June 21 – September 22. See Table 7 below for the load capacity and required reductions in bacteria in the Upper LSR and Big Creek.

Temperature

IDEQ water quality monitoring data show temperatures in the Upper LSR exceed the state maximum daily average standard. A TMDL for temperature was developed for the LSR Meadows Valley area. IDEQ used percent effective shade cover as a surrogate target for temperature; therefore, the potential natural vegetation (PNV) cover represents the maximum thermal loading capacity in the TMDL. IDEQ estimated existing shade cover for the Upper LSR using an aerial photograph analysis combined with solar pathfinder field verifications. Existing shade estimates are compared to PNV cover estimates to determine the target increase in thermal loading required in the TMDL (IDEQ, 2006). See Table 7 below for the solar load capacity and required reductions in solar thermal load in the Upper LSR.

Table 7. 2002 §303(d) listed stream segments: identified non-point source pollutants and required reductions.

Subwatershed	*§303(d) Segments*	*Listed Pollutants*	*Load Capacity (LC)*	*Reduction Required to meet LC*	*% Reduction Required*
Upper Little Salmon River	Big Creek to Round Valley Creek	Temperature	2,034,631 kWh/day	-365,630 kWh/day	-13%
		Bacteria	1.02 E11 cfu/day (average)	-3.69 E 11 cfu/day (average)	-71% (average)
		Nutrients (TP)	12.3 kg/day	-1.22 kg/day	-12%
	Vicks Creek to Big Creek	Temperature	2,034,631 kWh/day	-365,360 kWh/day	-13%
Big Creek	n/a	Bacteria	3.58 E10 cfu/day		-94%
		Nutrients (TP)	1.84 kg/day	-0.95 kg/day	-41%

(IDEQ, 2006)

Non-point Source Pollution Sources

There are many different possible contributing factors to the water quality problems in the Upper Little Salmon River and Big Creek subwatersheds. Hot, dry summers lead to naturally low stream flows and higher water temperatures during the critical period of June 21 – September 22. Irrigation withdrawals in the subbasin during this same period further diminishes flow which exacerbates high temperatures and the problems caused by excess phosphorous. While excess levels of phosphorus (P) have been identified through the ISDA monitoring as described above, no specific studies to quantify different sources of P have occurred in the subbasin. One potential source of P is cattle manure transported to the listed water bodies by surface water irrigation (Campbell, 2006). Other possible factors contributing to the transport of P into surface water are the desorption, dissolution and extraction of P from the soils, unstable stream banks, lack of riparian vegetation buffers, precipitation, runoff events, temperature, and anaerobic soil conditions (Shewmaker, 1997).

WATER QUALITY MONITORING

In response to the placement of the Upper Little Salmon River and Big Creek on the §303(d) list of impaired water bodies in Idaho, water quality monitoring has occurred in these subwatersheds to better understand the causes of the impairment. In addition to the monitoring conducted by IDEQ as part of the Little Salmon River subbasin assessment, the ISDA conducted three seasons of water quality monitoring from 2004 – 2006 at the request of the Little Salmon River Watershed Advisory Group (WAG). This project analyzed suspended sediment concentration, phosphorus, bacteria, and dissolved oxygen from sites located on different tributaries, including Big Creek, and the Little Salmon River in the meadows area (between New Meadows and Round Valley Creek). Results from these data show a trend of elevated phosphorus and bacteria levels during the summer months which promote low levels of dissolved oxygen in the Little Salmon

River. These data do not indicate any water quality concerns from suspended sediment concentrations. For more detailed information on the IDA's water quality monitoring data please refer to the Little Salmon River Meadows Area Water Quality Monitoring Reports which can be downloaded at http://www.idahoag.us/Categories/Environment/water/swReports.php.

A similar water quality monitoring effort was conducted in the meadows area of the Little Salmon River and its tributaries from 1980 – 1983 by the Soil Conservation Service (now NRCS), Idaho Department of Health and Welfare, and the Department of Community and Environmental Health and Boise State University in an effort to document baseline water quality characteristics in the watershed before expanding the irrigation season to its current length. This study measured the following water quality indicators: ammonia, nitrite, nitrate nitrogen, total phosphorus, bacteria, dissolved oxygen, pH, turbidity, temperature, suspended sediment, flow and hardness. This study found samples that failed state water quality criteria for fecal coliform bacteria, dissolved oxygen, total phosphorous, and temperature; however, the author found that fecal coliform bacteria was the only significant pollutant in the upper LSR during the period of this study. Stream flows measured in the LSR during this study showed a range of <20 cfs to 820 cfs at the lower end of the meadow section (above Round Valley Creek) to a minimum of <0.1 cfs near New Meadows during the summer below irrigation diversions (Edmundson, 1985).

AGRICULTURAL WATER QUALITY INVENTORY AND EVALUATION

Riparian

Staff from the ISCC and IASCD conducted agricultural riparian area assessments in the Big Creek and Upper Little Salmon River subwatersheds between 2001 and 2007. A photopoint inventory with a visual assessment of stream channel characteristics was conducted on Big Creek and the Upper Little Salmon River in July of 2001. A more complete and quantitative riparian assessment was completed on Big Creek between May and August of 2006 and on the Little Salmon River in October of 2007. These later riparian assessments used a modified NRCS Stream Visual Assessment Protocol (SVAP) and included the collection of solar pathfinder data to determine the amount of existing shade on the water bodies. Where SVAP data was missing, photo interpretation was used to estimate results. Results from these assessments are summarized below.

Big Creek

Results from the *Big Creek of Adams County, Idaho Physical Characterization of Riparian Area* report found a primary adjacent landuse of grazing and pastureland with grazing impacts varying from moderate to severe in the areas viewed. Above waypoint 062 (Figure 6), a fair amount of woody vegetation existed with limited regeneration. Below waypoint 062, woody vegetation occurrence and regeneration was limited influencing channel stability and morphology (Ferguson, 2001).

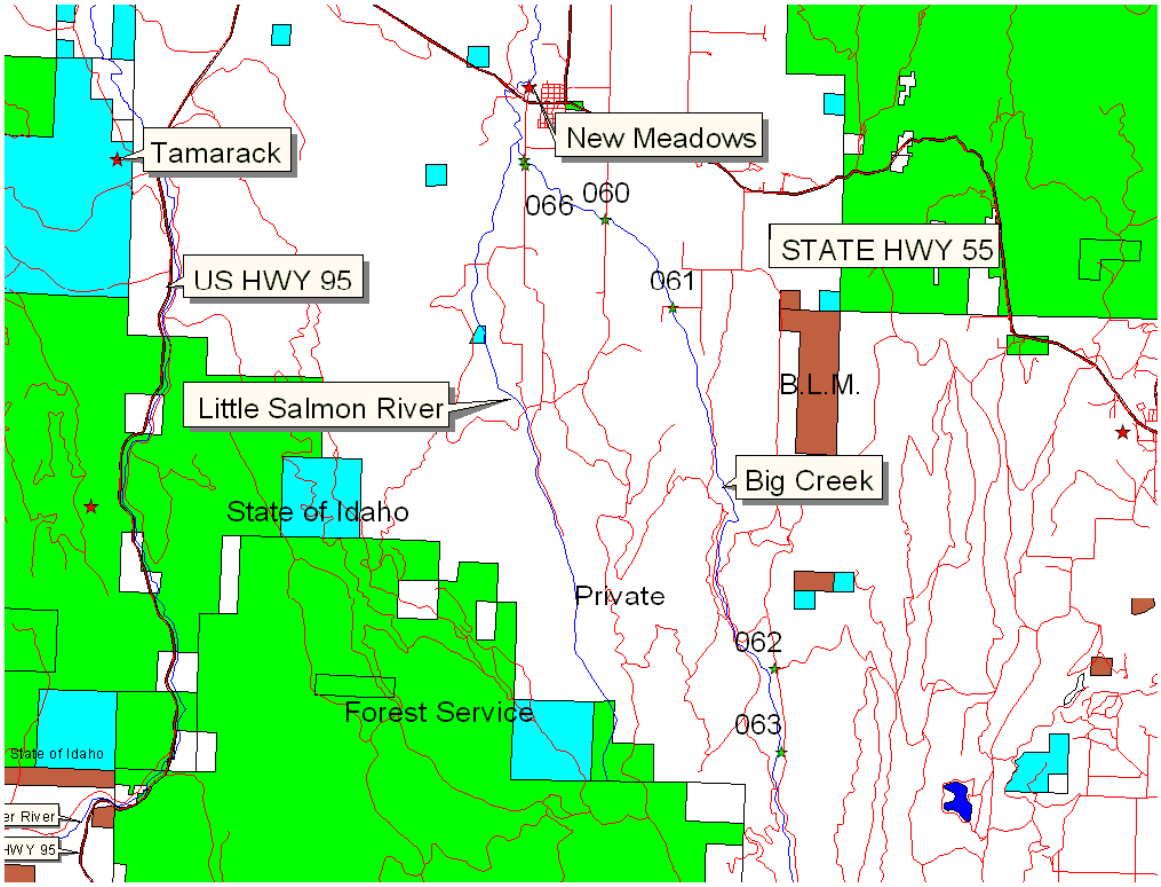

Figure 6. Waypoints marking points visually assessed in the 2001 Big Creek Physical Characterization of Riparian Area.

Results from the 2006 SVAP assessment are summarized in Table 8. In general the SVAP data show the stream in excellent or good condition on private lands in the timbered section of the watershed. As Big Creek nears the valley bottom land near New Meadows, impacts from irrigation withdrawals and agricultural uses increase and the data show the stream in fair to poor condition.

Table 8. Summary of SVAP results for Big Creek (Figure 7)

Total stream miles assessed:	~9 miles
Average for all reaches assessed:	Fair
Percent of stream in poor condition	6%
Percent of stream in fair condition	19%
Percent of stream in good condition	31%
Percent of stream in excellent condition	43%
Agricultural stream miles unassessed:	~ 3 miles

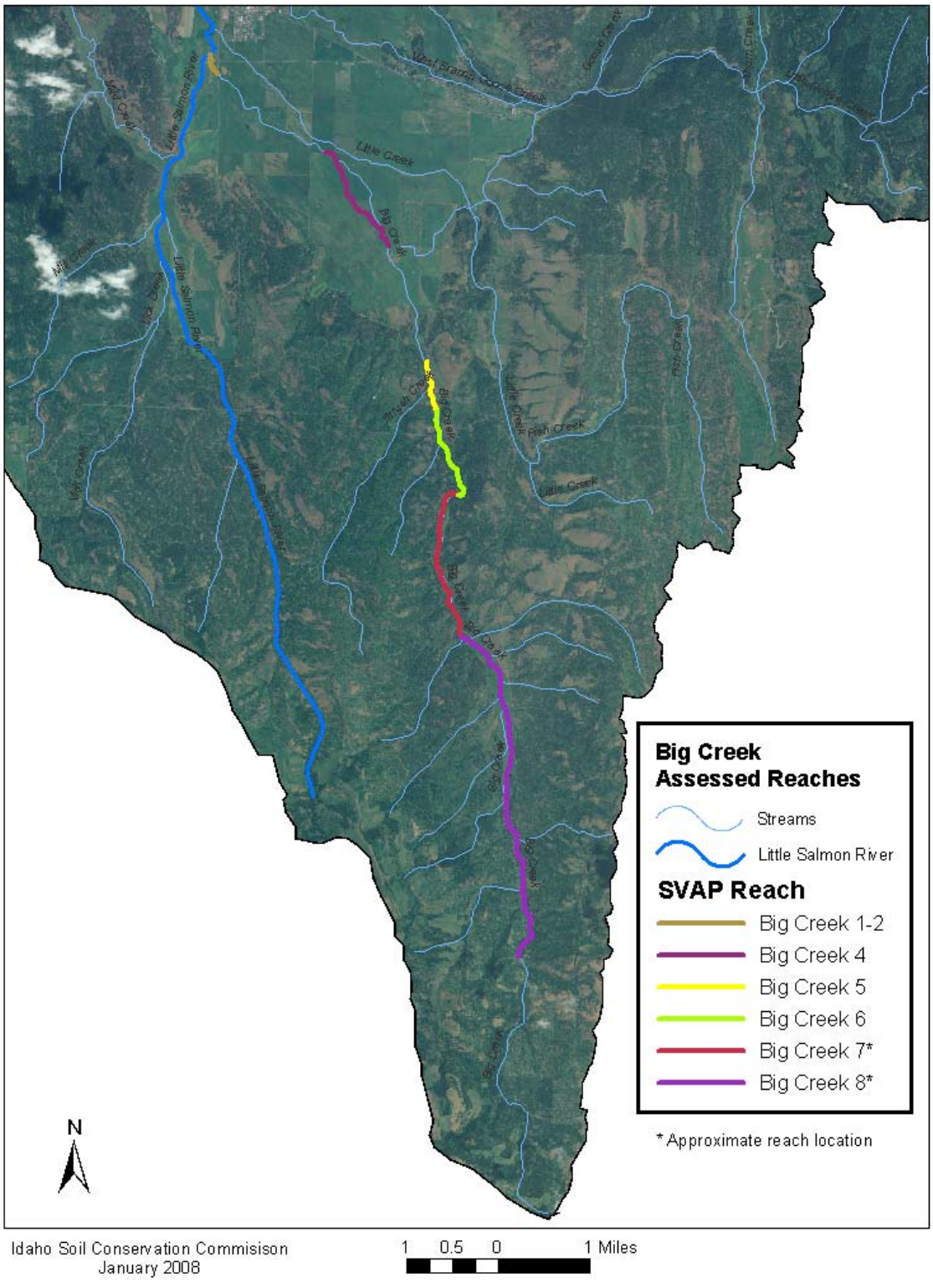

Figure 7. SVAP reaches on Big Creek.

Upper Little Salmon River

A summary of stream channel conditions found the primary adjacent landuse to be grazing and pasture (Ferguson, 2001 Most areas viewed in the assessment had a limited amount of woody vegetation. Grazing impacts included the removal of woody vegetation and slowing of woody species regeneration. Channel stability was poor throughout the area viewed (waypoint 064 to 082) except at waypoint 067 and at 071 where woody species were recovering (Figure 8). The channel appeared over-widened throughout the area viewed; however, channel sinuosity was appropriate for the stream and valley morphology (Ferguson, 2001).

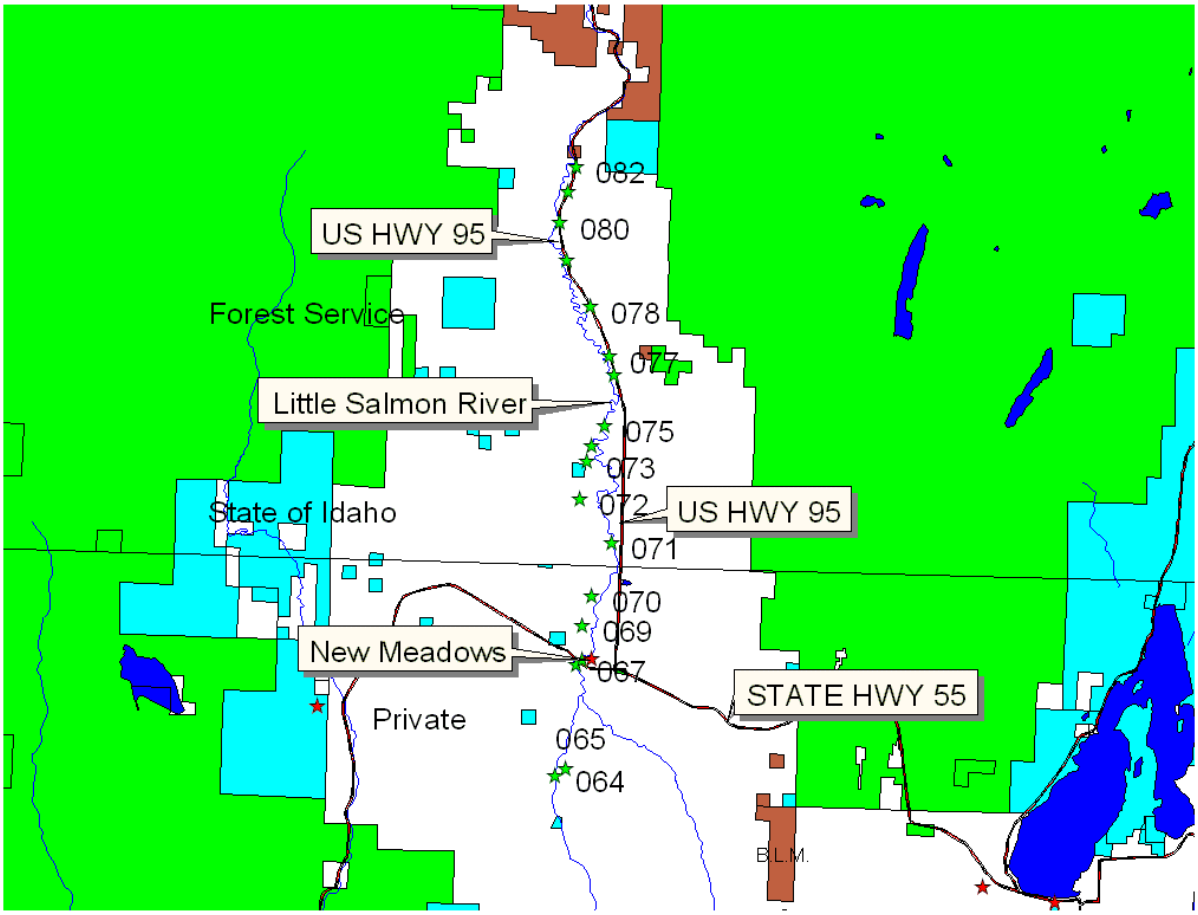

Figure 8. Waypoints marking points visually assessed in the 2001 Little Salmon River Physical Characterization of Riparian Area.

In October of 2007 ISCC staff performed SVAP on five reaches of the LSR including solar pathfinder readings (Table 9), stream erosion condition inventory, and photo documentation. The reaches were defined by previous water quality monitoring sites that had approved landowner access. Results from the 2007 SVAP assessment (Table 10) show Upper LSR in overall fair to

good condition. Reaches 3 and 4 (Figure 9) were close to natural/excellent condition due to a Wetland Reserve Program (WRP) that has been in place since 2000. Within this WRP corridor of the LSR, NRCS and its partners restored the river with BMPs that allow the river to act naturally by accessing the flood plain. Through this action alone the WRP corridor acts as a filter to settle out sediment and bind nutrients originating upstream. The condition of reaches 2-0 (Figure 9) was considerably impacted by grazing activities to the point that the solar load was significant, the riparian areas were lacking woody vegetation, and banks were unstable. Solar loading information was gathered by taking Solar Pathfinder readings within each of the five reaches. The solar pathfinder results are skewed to show loading during the six month period of April through September which coincides with less water volume and greater likelihood of thermal loading.

Table 9. Summary of Solar Pathfinder results for the Little Salmon River.

LSR Reach	*Percent Shaded (ISCC field data)*	*Percent shaded (IDEQ, Aerial Photo Interpretation)*
LSR 4	25.1 %	20%
LSR 3	6.2%	0%
LSR 2	6.17%	0%
LSR 1	5.6%	0%
LSR 0	8.06%	10%
Note: Solar readings were taken in October after most deciduous species had shed foliage		

Table 10. Summary of SVAP results for the Little Salmon River.

Total stream miles assessed:	18.4
Average condition for all reaches assessed:	fair
Percent of stream in poor condition	10%
Percent of stream in fair condition	39%
Percent of stream in good condition	51%
Percent of stream in excellent condition	0%

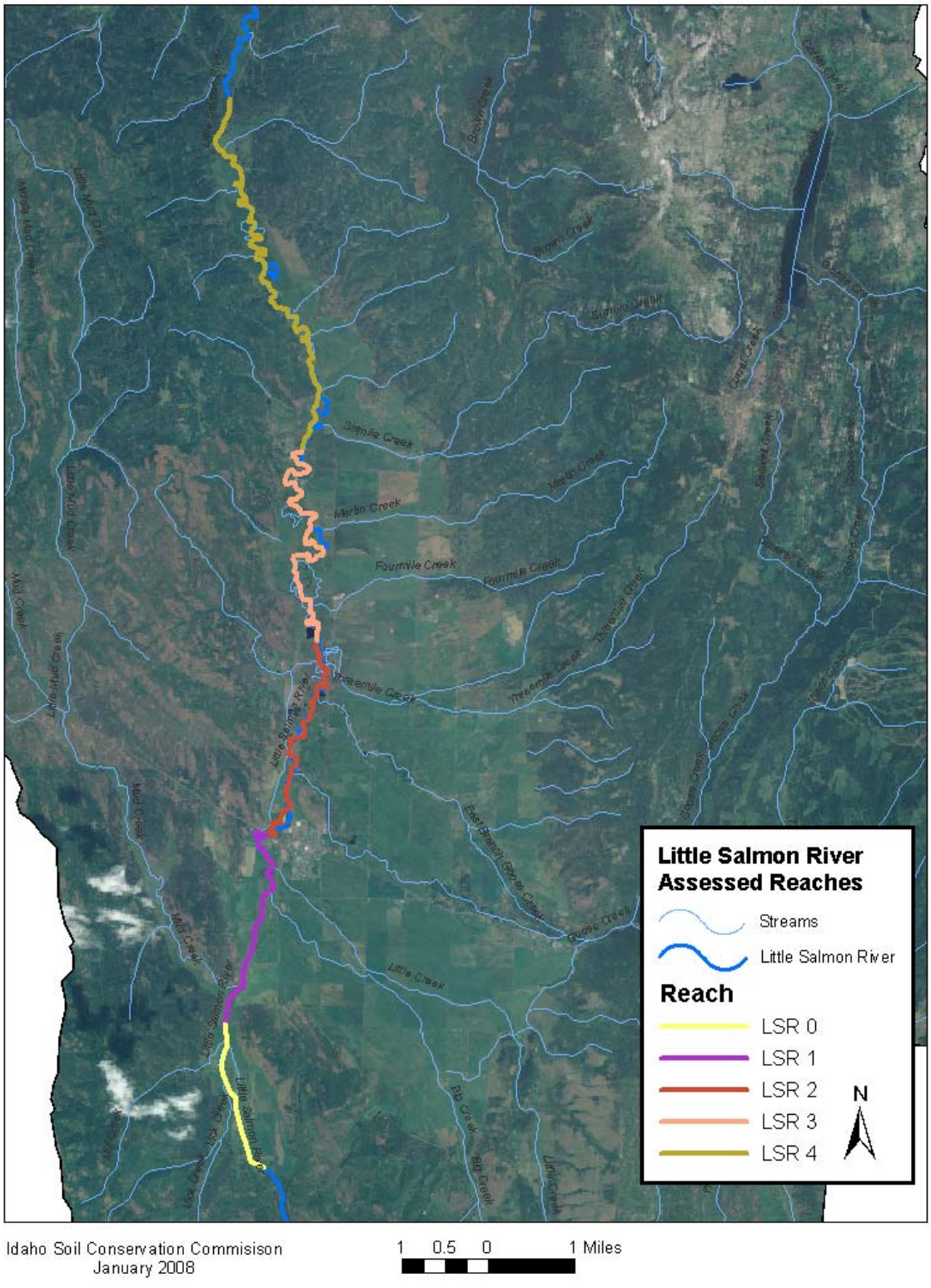

Figure 9. SVAP reaches on the Little Salmon River.

Pasture

NRCS staff conducted pasture condition inventories on select pastures in the subbasin in May of 2005. Both irrigated and non-irrigated pastures in the Upper Little Salmon River and Big Creek subwatersheds were inventoried. The NRCS Idaho pasture condition score sheet was used to rate pasture condition based on the visual evaluation of 10 indicators (% desirable plants, plant cover, plant diversity, plant residue, plant vigor, % legume/forbs, uniformity of use, livestock concentration areas, soil compaction, and erosion). Each indicator has five levels of conditions ranging from lowest (1) to highest (5). A pasture is given an overall condition score based on the sum of the individual indicator scores. The highest possible score is 50. Table 11 below shows the results for pastures inventoried. Average pasture condition scores in each of the subwatersheds fall in the 35 to 45 category indicating overall good pasture conditions needing only minor management changes to enhance resource conditions. According to NRCS staff, the results from the six pasture inventories summarized in Table 11 are representative of overall pasture conditions in the watershed (email communication with Ron Brooks 12/17/07).

Table 11. Results from NRCS 2005 Pasture Condition Scoresheets in the LSR subbasin.

Subwatershed	*Tributary*	*Total Acres*	*Average Score*
Big Creek	Big Creek	395	40.8
	Big Creek	286	42.5
Upper Little Salmon River	Four Mile Creek	613.8	42.0
	Goose Creek	783.6	40.2
	Goose Creek	375	40.7
	Martin Creek	160	41.5

THREATENED AND ENDANGERED SPECIES

In accordance with the federal Endangered Species Act (ESA), any on-the-ground installation of agricultural BMPs receiving federal or state support must include an assessment of impacts to species listed as threatened or endangered (T&E) in the project area. Threatened and endangered species with potential habitat in the Upper Little Salmon River and Big Creek subwatersheds are listed below in Table 12. None of these species are likely to occur in agricultural lowlands; however any BMP implementation that may affect a T&E species or its habitat will follow ESA consultation requirements. Note that a falls acts as a barrier at river mile 24 (Figure 10) stopping the migration of T&E listed species from the lower part of the subbasin into the upper part above Round Valley Creek. Agricultural conservation planning for the installation of BMPs recommended in this plan will be coordinated with other species recovery and protection efforts in the subbasin to improve listed species' habitats and address any potential impacts to T&E species from BMP implementation. When applicable, individual conservation plans will include consultation with agency biologists to identify BMPs that maximize benefits to listed species. Improvements in water quality achieved from the BMPs recommended in this plan are not expected to adversely affect listed species and should, in general, improve or enhance their habitat.

Table 12. ESA listed species present in Adams County, Idaho.

T&E Species	*Status*	*Distribution*
gray wolf (*Canis lupus*)	experimental/non-essential population	wide range of possible habitats in Adams County including forest, mountains, and grasslands
Canada lynx (Lynx canadensis)	threatened	very sparse population densities in high mountain spruce/fir forests
northern Idaho ground squirrel (*Spermophilus brunneus brunneus*)	threatened	dry meadows surrounded by ponderosa pine and Douglas fir forests; found only in Adams and Valley County
steelhead (Oncorhynchus mykiss)	threatened (proposed critical habitat)	mainstem LSR and lower tributaries below RM 24*
spring/summer chinook salmon *(Oncorhynchus tshawytscha)*	threatened	mainstem LSR and lower tributaries below RM 24*
fall chinook salmon (Oncorhynchus tshawytscha)	threatened	possible below RM 24*
bull trout (Salvelinus confluentus)	threatened (proposed critical habitat)	mainstem LSR below RM 24*, Rapid River, Boulder Creek, lower Hazard, Hard Creek
* note: RM (river mile) 24 is the location of a natural falls that serves as a physical barrier to the migration of fish in the Little Salmon River.		
Sources: http://www.fws.gov/idaho/agencies/COlists/Adams%20County.pdf , http://www.fws.gov/idaho/species/IdahoT&E.htm, http://library.fws.gov/Pubs/lynx.pdf, http://species.idaho.gov/list/groundsquirrels.html, & IDEQ, 2006		

Figure 10. Location of the barrier to fish migration between the upper meadows area and the lower canyon area of the Little Salmon River.

ANIMAL FEEDING OPERATIONS AND DAIRIES

According to the ISDA Division of Animal Industries there are no known Animal Feeding Operations (AFOs) or dairies located in the Little Salmon River subbasin.

Treatment

CRITICAL AREAS

Areas of agricultural lands that contribute pollutants to water bodies are defined as critical areas for BMP implementation. Critical areas are prioritized for treatment based on their location to a water body of concern and the potential for pollutant transport and delivery to the receiving water body. Critical areas are those areas in which treatment is considered necessary or useful to address resource concerns affecting water quality. Critical areas in the LSR subbasin designated in this TMDL implementation plan include agricultural lands within the Upper Little Salmon River and Big Creek subwatersheds below tree line. Generally these areas can be divided into pasture/hay fields and the riparian areas that flow through them. Agricultural lands that are documented to be in good condition are excluded from the critical area estimates.

TREATMENT UNITS (TU)

The following Treatment Units (TUs) describe areas in the LSR subbasin with similar land uses, soils, productivity, resource concerns, and treatment needs (Table 13 and Figure 11). These TUs not only provide a method for delineating and describing land use, but are also used to evaluate land use impacts to water quality and in the formulation of alternatives for solving water quality problems. BMPs to improve water quality are suggested for each treatment unit. Critical acres are the critical areas where BMP implementation would positively affect water quality within each treatment unit.

Table 13. Treatment Units in the LSR subbasin.

<table>
<tr><td colspan="4">Treatment Unit #1 - Riparian Areas</td></tr>
<tr><td>Total Acres</td><td>Critical Acres</td><td>Critical Areas Stream Length (linear feet)</td><td>Common Resource Problems</td></tr>
<tr><td rowspan="3">615</td><td>Big Creek
32</td><td>23,134</td><td rowspan="3">Lack of woody vegetation and regeneration
Lack of deep rooted riparian plant species
Unstable stream banks
Diminished stream flows from irrigation withdrawals
Altered channel morphology (lack of pools, overwidened)</td></tr>
<tr><td>LSR
246</td><td>75,716</td></tr>
<tr><td>unlisted tributaries
126</td><td>NA</td></tr>
<tr><td colspan="4">Treatment Unit #2 – Pasture/Hay Lands</td></tr>
<tr><td>Total Acres</td><td>Critical Acres</td><td colspan="2">Common Resource Problems</td></tr>
<tr><td>15,206</td><td>11,690</td><td colspan="2">Potential for nutrient runoff/leaching</td></tr>
</table>

The riparian treatment unit was delineated as three times an average channel width (to approximate a buffer of one channel width on each side of the stream) based on the recommendation of local NRCS field staff. The treatment area was calculated in Arc GIS using the USGS 1:24,000 DLG stream layer clipped to private lands below tree line. Average channel width was estimated from measurements taken from NAIP aerial imagery. The riparian treatment unit (TU 1) width for the LSR is 42 meters, and TU width for Big Creek and all unlisted tributaries is 18 meters. Riparian areas known to be in good functional condition were excluded from the estimate of critical riparian acres. This included the LSR from the WRP (see conservation accomplishments section) downstream to the mouth of Round Valley Creek and treated portions of Fourmile Creek, East Branch Goose Creek, and Big Creek.

The pasture/hay lands treatment unit (TU 2) was estimated in Arc GIS by digitizing pasture/hay fields below tree line in the Upper Little Salmon River and Big Creek subwatersheds. The USDA Farm Service Agency's crop land unit (CLU) layer was used as a guide where appropriate. Areas of urban/residential development around the town of New Meadows were excluded from TU 2. In addition, pasture/hay lands enrolled in the NRCS's Conservation Security Program (CSP) and the WRP and the CRP projects (see conservation accomplishments section) are known to be in good condition and were therefore excluded from the estimate of critical pasture/hay lands acres.

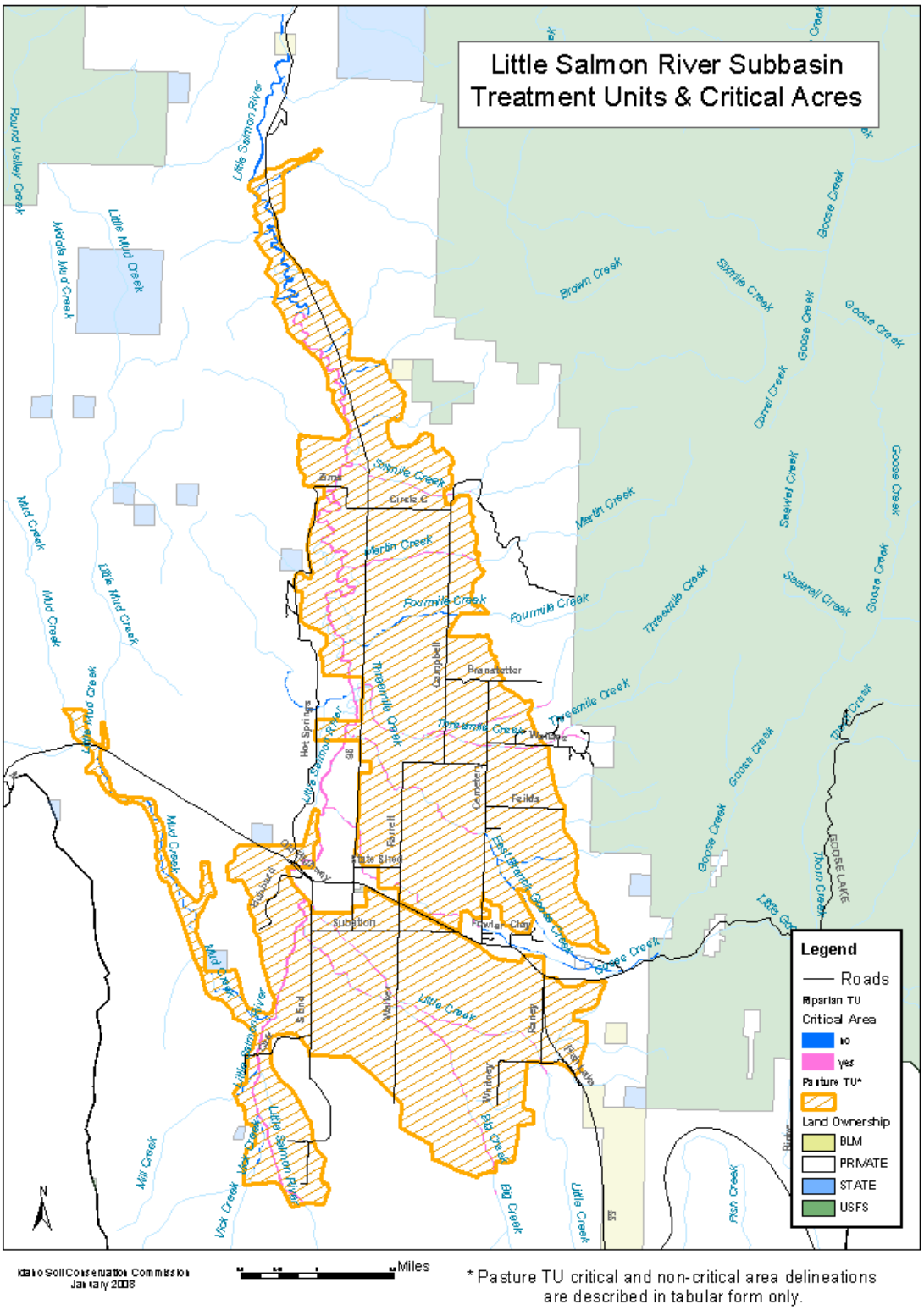

Figure 11. Little Salmon River Subbasin Treatment Units and Critical Areas.

RECOMMENDED BMPS AND ESTIMATED COSTS

BMPs and their installation costs are listed below in Table 14. Individual conservation planning for willing landowners will determine the most appropriate BMPs to install on a case by case basis. The quantities of each BMP recommended to install will depend on these plans. The information included in Table 14 provides an estimate only of the BMPs recommended for TU 1 and TU2 in the subbasin and their approximate costs.

Table 14. Recommended BMPs and estimated costs.

TU #1 Riparian Areas		
Recommended BMPs	*NRCS Practice Code*	*Estimated Total Cost**
Channel Bank Vegetation – willow cutting pole planting	322	$2.73/ft
Fence – barb wire	382	$2.31/ft
Fence – jack/wood rail	382	$6.51/ft
Spring Development	574	$2,400.00 each
Use Exclusion	472	$34.00/acre
Watering Facility	614	$866.67 each
TU #2 Pasture/Hay Lands		
Recommended BMPs	*NRCS Practice Code*	*Estimated Cost**
Irrigation Water Management – low intensity	449	$5.00/acre
Prescribed Grazing – pasture site	528	$5.00/acre
Structure for Water Control	587	$1,266.67/each
Irrigation Water Conveyance, Pipeline – type and size of pipe will vary based on individual site needs	430DD	Varies based on site needs
Above Ground Multioutlet pipeline (gated pipe) – 12 inch	431	$12.40/foot
* Estimated costs based on the October 2007 Idaho NRCS payment schedule. Estimated total cost includes landowner and cost share contributions.		

ADDITIONAL FIELD ASSESSMENTS AND PLANNING

In order to further define treatment needs in the Big Creek and Upper Little Salmon River subwatersheds, additional agricultural water quality inventory and evaluation is recommended. Specific field assessment priorities include conducting SVAP inventories and pasture condition assessments on the portions of Big Creek unassessed in 2006 and unlisted tributaries to the Upper Little Salmon River including Sixmile, Martin, Fourmile, Threemile, Goose, Little, and Mud Creeks.

RECOMMENDED PRIORITIES FOR BMP IMPLEMENTATION

The implementation of agricultural BMPs in the LSR basin are prioritized based on their potential to help meet the water quality goals stated in the LSR TMDL. Priorities for treatment are based on the information and data described in this plan with oversight from the Adams SWCD board of supervisors. Implementation priorities are coordinated with the Adams SWCD Annual Work Plan. Table 15 lists priorities for BMP implementation for the improvement of water quality. The Conservation District's main objective is to meet the requirements of Section 319 of the 1987 Water Quality Act, the 1986 Safe Drinking Water Act, and the 1972 Clean Water Act. This plan also has the goal of identifying and prioritizing conservation and water quality projects found by the District to be appropriate for impacted waters.

Table 15. Priorities for BMP implementation in the LSR subbasin.

Priority Ranking	*TUs*	*Rationale*
1	riparian areas on Big Creek and LSR	Treating the riparian areas adjacent to the 303(d) listed water bodies will have the most affect on improving water quality in those reaches.
2	riparian areas on tributaries	Water quality of the tributaries to the 303(d) stream reaches influences the water quality of the listed reaches and therefore improving resource conditions on these tributaries will positively affect meeting TMDL water quality criteria in the subbasin. Additional stream and pasture assessment is recommended for these areas.
3	All pasture/hay lands	With adequate riparian buffers and good riparian conditions, upland pasture/hay land conditions will have a lesser influence on water quality in the subbasin.

Funding

Financial and technical assistance for installation of BMPs is needed to ensure success of this implementation plan. The Adams Soil and Water Conservation District will actively pursue multiple potential funding sources to implement water quality improvements on private agricultural and grazing lands. Many of these programs can be used in combination with each other to implement BMPs.
These sources include (but are not limited to):

CWA 319 –These are Environmental Protection Agency funds allocated to the Nez Perce Tribe and the State of Idaho. The Idaho Department of Environmental Quality (DEQ) administers the Clean Water Act §319 Non-point Source Management Program for areas outside the Nez Perce Reservation. Funds focus on projects to improve water quality and are usually related to the TMDL process. The Nez Perce tribe has CWA 319 funds available for projects on Tribal lands on a competitive basis. Source: DEQ
http://www.deq.idaho.gov/water/prog_issues/surface_water/nonpoint.cfm#management

Water Quality Program for Agriculture (WQPA) –The WQPA is administered by the Idaho Soil Conservation Commission (ISCC). This program is also coordinated with the TMDL process. Source: ISCC http://www.scc.state.id.us/programs.htm

Resource Conservation and Rangeland Development Program (RCRDP) –The RCRDP is a loan program administered by the ISCC for implementation of agricultural and rangeland best management practices or loans to purchase equipment to increase conservation. Source: ISCC http://www.scc.state.id.us/programs.htm

Conservation Improvement Grants – These grants are administered by the ISCC. Source: ISCC http://www.scc.state.id.us/programs.htm

PL-566 –This is the small watershed program administered by the USDA Natural Resources Conservation Service (NRCS).

Agricultural Management Assistance (AMA) –The AMA provides cost-share assistance to agricultural producers for constructing or improving water management structures or irrigation structures; planting trees for windbreaks or to improve water quality; and mitigating risk through production diversification or resource conservation practices, including soil erosion control, integrated pest management, or transition to organic farming. Source: NRCS http://www.nrcs.usda.gov/programs/ama/

Conservation Reserve Program (CRP) –The CRP is a land retirement program for blocks of land or strips of land that protect the soil and water resources, such as buffers and grassed waterways. Source: NRCS http://www.nrcs.usda.gov/programs/crp/

Conservation Technical Assistance (CTA) –The CTA provides free technical assistance to help farmers and ranchers identify and solve natural resource problems on their farms and ranches. This might come as advice and counsel, through the design and implementation of a practice or treatment, or as part of an active conservation plan. Source: local Conservation District and NRCS: http://www.nrcs.usda.gov/programs/cta/

Environmental Quality Incentives Program (EQIP): EQIP offers cost-share and incentive payments and technical help to assist eligible participants in installing or implementing structural and management practices on eligible agricultural land. Source: NRCS http://www.nrcs.usda.gov/programs/eqip/

Wetlands Reserve Program (WRP) –The WRP is a voluntary program offering landowners the opportunity to protect, restore, and enhance wetlands on their property. Easements and restoration payments are offered as part of the program. Source: NRCS http://www.nrcs.usda.gov/programs/wrp/

Wildlife Habitat Incentives Program (WHIP) –WHIP is a voluntary program for people who want to develop and improve wildlife habitat primarily on private land. Cost-share payments for

construction or re-establishment of wetlands may be included. Source: NRCS http://www.nrcs.usda.gov/programs/whip/

State Revolving Loan Funds (SRF) –These funds are administered through the ISCC. Source: ISCC http://www.scc.state.id.us/programs.htm

Grassland Reserve Program (GRP) –The GRP is a voluntary program offering landowners the opportunity to protect, restore, and enhance grasslands on their property. Source: NRCS. http://www.nrcs.usda.gov/programs/GRP/

Conservation Security Program (CSP) –CSP is a voluntary program that rewards the Nation's premier farm and ranch land conservationists who meet the highest standards of conservation environmental management. Source: NRCS http://www.nrcs.usda.gov

Grazing Land Conservation Initiative (GLCI) –The GLCI's mission is to provide high quality technical assistance on privately owned grazing lands on a voluntary basis and to increase the awareness of the importance of grazing land resources. Source: http://www.glci.org/

HIP – This is an Idaho Department of Fish and Game program to provide technical and financial assistance to private landowners and public land managers who want to enhance upland game bird and waterfowl habitat. Funds are available for cost sharing on habitat projects in partnership with private landowners, non-profit organizations, and state and federal agencies. Source: IDFG http://fishandgame.idaho.gov/cms/wildlife/hip/default.cfm

Partners for Fish and Wildlife Program in Idaho – This is a U.S. Fish and Wildlife program providing funds for the restoration of degraded riparian areas along streams, and shallow wetland restoration. Source: USFWS http://www.fws.gov/partners/pdfs/ID-needs.pdf

Outreach

Conservation partners in the Little Salmon River subbasin including the Adams SWCD, NRCS, ISCC, IASCD, WAG and IDEQ will use their combined resources to provide information about BMPs to improve water quality to agricultural landowners and operators within the subbasin. A local outreach plan may be developed. Newspaper articles, district newsletters, watershed and project tours, landowner meetings and one-on-one personal contact may be used as outreach tools.

Outreach efforts will:
Provide information about the TMDL process to the public
Distribute water quality monitoring reports
Accelerate the development of conservation plans and program participation
Enhance technology transfer related to BMP implementation
Increase public understanding of agriculture's contribution to conserve and enhance natural resources and agriculture's commitment to meeting the TMDL challenge

Monitoring and Evaluation

FIELD LEVEL

At the field level, annual status reviews will be conducted to insure that the contracts are on schedule and that BMPs are being installed according to standards and specifications. BMP effectiveness monitoring will be conducted on installed projects to determine installation adequacy, operation consistency and maintenance, and the relative effectiveness of implemented BMPs in reducing water quality impacts. This monitoring will also measure the effectiveness of BMPs in controlling agricultural nonpoint-source pollution. These BMP effectiveness evaluations will be conducted according to the protocols outlined in the Agriculture Pollution Abatement Plan and the ISCC Field Guide for Evaluating BMP Effectiveness.

The Revised Universal Soil Loss Equation (RUSLE) and Surface Irrigation Soil Loss (SISL) Equation are used to predict sheet and rill erosion on non-irrigated and irrigated lands. The Alutin Method, Imhoff Cones, and direct-volume measurements are used to determine sheet and rill irrigation-induced and gully erosion. Stream Visual Assessment Protocol (SVAP) and Streambank Erosion Condition Inventory (SECI) are used to assess aquatic habitat, stream bank erosion, and lateral recession rates. The Idaho OnePlan's CAFO/AFO Assessment Worksheet is used to evaluate livestock waste, feeding, storage, and application areas. The Water Quality Indicators Guide is utilized to assess nitrogen, phosphorus, sediment, and bacteria contamination from agricultural land.

WATERSHED LEVEL

At the watershed level, there are many governmental and private groups involved with water quality monitoring. The Idaho Department of Environmental Quality uses the Beneficial Use Reconnaissance Protocol (BURP) to collect and measure key water quality variables that aid in determining the beneficial use support status of Idaho's water bodies. The determination will tell if a water body is in compliance with water quality standards and criteria. In addition, IDEQ will be conducting five-year TMDL reviews.

Annual reviews for funded projects will be conducted to insure the project is kept on schedule. With many projects being implemented across the state, ISCC developed a software program to track the costs and other details of each BMP installed. This program can show what has been installed by project, by watershed level, by sub-basin level, and by state level. These project and program reviews will insure that TMDL implementation remains on schedule and on target. Monitoring BMPs and projects will be the key to a successful application of the adaptive watershed planning and implementation process.

References

Campbell, K. 2005. *Little Salmon River and Big Creek Water Quality Monitoring Report*. Boise, ID: Idaho State Department of Agriculture.

Campbell, K. 2006. *Little Salmon River Year Two Water Quality Monitoring Report*. Boise, ID: Idaho State Department of Agriculture.

Campbell, K. 2007. Little Salmon River Meadows Area Water Quality Monitoring Report Tributary Evaluation. Boise, ID: Idaho State Department of Agriculture.

Edmundson, E. 1985. Water Quality Characteristics of the Little Salmon River Near New Meadows, Idaho. Boise, ID: Boise State University.

Ferguson, D.F. 2001. Big Creek of Adams County, Idaho Physical Characterization of Riparian Area. Boise, ID: Idaho Soil Conservation Commission.

Ferguson, D.F. 2001. Little Salmon River of Adams County, Idaho Physical Characterization of Riparian Area. Boise, ID: Idaho Soil Conservation Commission.

Idaho Department of Environmental Quality (IDEQ). 2006. *Little Salmon River Subbasin Assessment and TMDL*. Boise, ID: Boise Regional Office, Idaho Department of Environmental Quality.

Idaho Water Resource Board (IWRB). 2001. Comprehensive State Water Plan – Part B Little Salmon River Basin.

McGrath C.L., Woods A.J., Omernik, J.M., Bryce, S.A., Edmondson, M., Nesser, J.A., Shelden, J., Crawford, R.C., Comstock, J.A., and Plocher, M.D. 2002. *Ecoregions of Idaho* (color poster with map, descriptive text, summary tables, and photographs): Reston, VA: U.S. Geological Survey (map scale 1:1,350,000).

Natural Resources Conservation Service (NRCS). 2007. *Little Salmon 17060210 8 Digit Hydrology Unit Profile* (Rapid Watershed Assessment). Boise, ID: U.S. Department of Agriculture Natural Resources Conservation Service.

Shewmaker, G.E. 1997. *Livestock Grazing: A Tool for Removing Phosphorus from Irrigated Meadows*. Denver, CO: U.S. Committee on Irrigation and Drainage.